Compositae of Southern California.—H. M. HALL[18] has brought together our present knowledge of the Compositae of Southern California, an area about the size of Pennsylvania. The 445 species and varieties are distributed as following among the tribes: Eupatorieae (9), Astereae (113), Inuleae (25), Ambrosieae (18), Heliantheae (34), Madieae (29), Helenieae (86), Anthemideae (19), Senecioneae (25), Cynareae (17), Mutisieae (2), Cichorieae (68). These numbers would be largely increased if the author were not very conservative in his conception of species. As it is, the contribution becomes a manual of readily recognized forms, which are further brought within easy reach by the numerous well-constructed keys. It is unusual to find in so extensive a contribution that only three new species have been described, two in Aster and one in Lessingia. However, there is large recognition of varieties, many new ones being proposed; and new combinations are frequent. The reduction of numerous names to synonymy may be a service or may add to the confusion, dependent upon the care with which the types were studied. In any event, this type of monograph for so interesting a region is to be commended.—J. M. C.

Nuclear division in Zygnema.—ESCOYEZ[19] has published the results of cytological studies on Zygnema. The conclusions are as follows: (1) A chromatin network forms chromosomes by gradual concentration. (2) The nucleolus contains no chromatin substance and does not furnish any morphological elements to the chromosomes. (3) The chromosomes are not formed by the fusion of four groups of chromatin granules, as was claimed by Miss MERRIMAN. (4) The chromosomes split longitudinally in the metaphase as in typical mitosis. (5) In the telophase the chromosomes first become massed at the poles and then vacuolated. The anastomosed structure of the nucleus consists entirely of chromosomes. (6) The nucleolus is not formed by the confluence of chromosomes, but appears quite independent of the chromatin network. (7) There is formed no continuous spirem, and the chromosomes evidently keep their individuality. (8) Pyrenoids and chromatophores divide simply by constriction, and the division is independent of that of nucleus. The division of the two pyrenoids does not necessarily occur simultaneously.—S. YAMANOUCHI.

The double leaf trace.—MISS THOMAS[20] has brought together the facts in reference to the double leaf-trace, so characteristic of the ancient fern and older gymnosperm series, and well marked in the living cycads. This condition is claimed to exist in the "double bundle" of the cotyledons of angiosperms, and is of very frequent occurrence in modern ferns. A phenomenon of such wide occurrence suggests "the existence of a common cause of a fundamental and primitive character," and this the author finds in dichotomous branching; which means

[18] HALL, H. M., Compositae of Southern California. Univ. Calif. Publ. Bot. **3**:1–302. *pls. 1–3.* 1907.

[19] ESCOYEZ, EUD., Le noyau et la caryocinèse chez le Zygnema. La Cellule **24**:356–366. *pl. 1.* 1907.

[20] THOMAS, ETHEL N., A theory of the double leaf-trace founded on seedling structure. New Phytologist **6**:77–91. *figs. 4.* 1907.

that the double leaf-trace "is neither more nor less than an early dichotomy of the vascular system of the leaf." This persistent dichotomy of the leaf-trace, long after dichotomy has disappeared from the leaf, is used to explain the irregular dichotomy of the leaves of Cycadofilices, the dichotomy of the early leaves of modern ferns, the splitting of cotyledons in polycotyledony; and "it finds its latest expression in the 'double bundle' of the cotyledons of angiosperms." This view certainly helps to connect the angiosperms with the same old fern stock that gave rise to the gymnosperms.—J. M. C.

Effect of electricity.—A very concise summary of the work previously published upon the effect of electricity on the growth and development of plants is furnished by PRIESTLEY[21] as the preface to a brief account of some recent experiments on a large scale by NEWMAN near Bristol, Gloucester, and Evesham. The current used was of high tension, distributed by overhead wires from which depended metallic points. In general the results show a very decided increase in the quantity, or quality, or earliness of the crop. Thus year-old strawberries showed 80 per cent. increase, Canadian Red Fife wheat 39 per cent. The electrified wheat produced a better baking flour and consequently sold at 7.5 per cent. higher prices. Electrified beets not only showed 33 per cent. increase in the crop, but contained over 14 per cent. more sugar. Currents traversing the earth produced occasionally increase in rate of growth, but often had no definite effect. The physiological action of the current is not clear. PRIESTLEY rejects POLLACCI's view that it enables the green plant to elaborate starch in the dark.—C. R. B.

A theory of photosynthesis.—GIBSON outlines[22] thus a photoelectric theory of photosynthesis, which he is to elaborate later in cooperation with two colleagues: The light rays absorbed by chlorophyll are transformed by it into electric energy which effects the decomposition of H_2CO_3, with the concomitant formation of an aldehyde and the evolution of oxygen. He finds a small quantity of formaldehyde present, as shown by the test of MULLIKEN, BROWN, and FRENCH, in all actively photosynthetic tissues, the amount being definitely related to the illumination. The maximum decomposition of CO_2 occurs in light equal to one-quarter direct sunlight. H.COH may be synthesized from CO_2 in the presence of water by a silent electric discharge, as LOEB has shown; and this GIBSON confirms. Electric discharges of sufficient intensity have already been found in adequately illuminated green tissues, and the light rays absorbed by chlorophyll are the ones which produce these currents. He promises in the forthcoming paper to connect formaldehyde with carbonic acid by a photolytic method which is above suspicion. —C. R. B.

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[21] PRIESTLEY, J. H., The effect of electricity upon plants. Proc. Bristol Nats. Soc. IV. 1:192–203. 1907.

[22] GIBSON, R. J. HARVEY, A photoelectric theory of photosynthesis. Annals of Botany 22:117–120. 1908.